Competitive Behavior in Orange Juice Markets

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Abstract: This article examines how the movement towards a larger more consolidated orange juice marketing system affects market prices. Observing the retail price for specific orange juice products, including leading national brands and private label brands, in 54 U.S. markets over a 1-year period can help us discern the pricing behavior of brand marketers, wholesalers, and retailers in these markets. The data provided little compelling evidence that markets further advanced in the consolidation process engaged in non-competitive pricing behavior. However, increased brand competition, particularly between private label and leading national brands, does appear to lower average market prices.

Keywords: Consumer demographics, national brands, orange juice, price behavior, private labels, wholesale and retail concentration.

Introduction

Orange growers and orange juice consumers comprise the beginning and end points of the orange juice supply chain. In the United States, no single orange grower produces enough product to influence the price they receive in the market, nor does any group of consumers purchase enough product to influence the price they pay. However, the processing, packaging, and distributing stages of the orange juice supply chain have become increasingly concentrated, with several big companies controlling large shares of the orange juice market at different stages along the supply chain. When firms become very large, they may be able to exercise their influence on market prices. When this happens, they gain at the expense of growers and consumers.

Firms are motivated to grow in part so they can realize potential cost savings that often come with increasing size and/or scope of production. When firms achieve cost savings through expansion, they are often able to offer their products at lower prices than their smaller competitors. This may lead to obtaining higher market shares and eventual concentration of industries participating in particular market segments. With these two forces in play within the highly concentrated orange juice marketing system, an examination of market data is presented below to discern if non-competitive or lower cost pricing behaviors are more evident in the observed prices.

To understand the effects of industry concentration, one can observe a market over time, or observe many different markets at some point in time. This paper presents analysis of the latter type, focusing on specific orange juice commodity market prices across 54 U.S. grocery marketing areas (table B-1) over a 52-week period, November 4, 1989, to November 2, 1990. There are a number of advantages to taking this approach. First, while the decade of the 1990s witnessed dramatic movements toward consolidation in the orange juice marketing system, regional markets in 1990 exhibited wide variability in their stages of consolidation. Many grocery marketing areas had four-firm concentration ratios[2] (CR-4) near or above 90 percent in both the wholesale and retail stages of the grocery marketing system. Many other marketing areas had CR-4 ratios around or below 50 percent at wholesale and/or retailing stages.

Another advantage to looking at the markets over this period is that it encompasses the time before, during, and after a severe negative supply shock in the Florida orange crop, brought on by the December 1989 orange freeze. To observe price behavior, prices must change and in this period, retail prices went from their 1989 low point to the highest levels obtained in the decade of the 1990s, and eventually back down again. How individual brand prices change in these conditions can say a lot about the competitive behavior in the industry.

A third advantage to the 1989/90 time period is that it affords the use of a unique data resource that has since been discon-

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[2] The four-firm concentration ratio measures the share of total sales within a well defined market going to the four largest companies operating in that market, for example grocery sales in the wholesale or retail segment of the Baltimore, MD grocery marketing area.

Table B-1--Regional markets

East		Midwest		South		West
Albany, NY	Scranton, PA	Charleston, WV	Milwaukee, WI	Atlanta, GA	Memphis, TN	Denver, CO
Baltimore, MD	Syracuse, NY	Chicago, IL	Minneapolis, MN	Birmingham, AL	Miami, FL	El Paso, TX
Boston, MA		Cincinnati, OH	Oklahoma City, OK	Charleston, SC	Nashville, TN	Los Angles, CA
Buffalo, NY		Cleveland, OH	Omaha, NE	Charlotte, NC	New Orleans, LA	Phoenix, AZ
Hartford, CT		Detroit, MI	Peoria, IL	Dallas, TX	Norfolk, VA	Portland, OR
New York, NY		Grand Rapids, MI	Quad Cities, IL	Greenville, SC	Raleigh, NC	Salt Lake City, UT
Philadelphia, PA		Green Bay, WI	St. Louis, MO	Houston, TX	San Antonio, TX	San Francisco, CA
Pittsburgh, PA		Indianapolis, IN	Wichita, KS	Jacksonville, FL	Shreveport, LA	Seattle, WA
Portland, ME		Kansas City, MO		Louisville, KY		Spokane, WA

tinued. Data for this analysis come from Selling-Area Markets, Inc. (SAMI), a grocery marketing research firm that ceased operations in December 1990, at which time much of their data resources were donated to Purdue University. Information contained in this data includes complete shipping logs from grocery-shipping warehouses serving supermarkets in 54 distinct grocery marketing areas (GMA) whose total sales represented around 85 percent of U.S. supermarket sales. Log entries included shipments and average unit prices, in continuous 4-week intervals, of specific grocery items sold in each market area. This study uses summaries of this data for average prices over four approximately 3-month quarters ending November 2, 1990. The prices are for two frozen concentrate national brand products, two refrigerated national brand products,[3] and an average price for all 'private label' products, one frozen concentrate average and one refrigerated average. Also used for this analysis is the market share that each brand (including the combined private label brands) controls within each market.

The remainder of the paper is organized as follows. The next section presents price analysis for the six orange juice commodities taken from the SAMI data. The analysis will take into account such factors as wholesale and retail concentration, private label market shares, and average household income of consumers in each GMA. Then a consideration of this price analysis is made in the context of current trends in food marketing systems. A separate box insert is also included for readers interested in a background of the orange juice marketing system. Some of the material in this box insert can be found, in greater depth, in the website *www.ultimatecitrus.com*. This background focuses on the Florida orange juice industry, which typically accounts for over 90 percent of orange juice production marketed in the United States.

Price Analysis

By 1997, the average Florida orange grove was 40 percent larger than in 1987 (*1997 Census of Agriculture*). Florida orange juice processing firms totaled 27 in the 1989-90 season, while only 18 firms processed orange juice in Florida in the 2000-01 season (Spreen and Fernandes). About half of all processed orange juice produced in Florida is branded by the two leading national orange juice marketing processors (Hardy). About half of all groceries purchased in supermarkets nationwide were purchased from the 20 largest grocery chains—this represents an increase of about one-third in the 20-firm supermarket share since the early 1990s. Between the marketing processors or packagers and retailers, grocery wholesalers have also become far more consolidated since 1990. Working backwards from retailing to branding, a closer look is taken at local market pricing behavior, both in markets more advanced in this trend towards consolidation and markets far less so.

Retail orange juice prices tend to vary by form (e.g., FCOJ, NFC and RECON), by brand and private label, by season (reflecting uneven supply conditions over time), by shipping distance from primary producing regions (e.g., shipping distance from Florida), by product attributes (e.g., calcium and pulp), and by socioeconomic attributes of the consumer (e.g., average household income in the market area). To minimize the confusion that these factors create in our ability to explain observed retail prices in this analysis, a num-

Definitions

Not From Concentrate (NFC)—Juice that is flash-heated to pasteurize it immediately after the fruit is squeezed.

From Concentrate (RECON)—Juice manufactured as a frozen concentrate, then reconstituted by adding back the amount of water originally removed.

Frozen Concentrate (FCOJ)—Freshly squeezed juice that has been concentrated and frozen. Consumers reconstitute the juice by adding back the amount of water originally removed.

Source: Florida Department of Citrus.

[3] The four national brand products examined were each sold in all 54 marketing areas, while the two private label categories examined represent average prices of all private label FCOJ and from concentrate refrigerated orange juice respectively, sold within each GMA.

ber of steps are taken. First, specific national brand products are examined, both over time and across markets. For example, a line of FCOJ of a specific brand name, size, and type of container, will be examined. For the private label products, the specificity may vary by region. Secondly, price observations are separated into four approximately equal time periods spanning 1 year. Accounts of the other considerations mentioned here will be discussed in the concluding section of this article. Analysis begins with a look at retail consolidation.

Retailers. In 1990, grocery sales by the four largest grocery chains operating in a single SAMI grocery marketing area accounted for, on average, just under 70 percent of that area's grocery sales.[4] In some regions, the four largest grocery chains served over 85 percent of the retail market in their area, while other marketing areas saw less than half their market being served by the four largest chains (Metro Market Studies). With such wide variation in retail concentration of local marketing areas, it is useful to group data from the 10 markets with the highest concentration of larger grocery chains, group data from the 10 markets with the lowest concentration, and compare prices among the two groups.

This is what was done, as reported in figure B-1. Average price data for six orange juice products are presented for both the group of 'low' retail concentration markets (depicted by the light colored bars) and the group of 'high' retail concentration markets (depicted by the dark-colored bars). Prices are reported as averages for four 3-month periods beginning November 4, 1989.[5] The six products include three FCOJ products and three refrigerated products, and the figure groups the frozen and refrigerated products in two separate graphs. 'Brand 1' and 'Brand 2' under the frozen segment are specific basic leading national brand frozen concentrate products—that is, they are the exact same product in every marketing area. Also in the frozen segment, 'private label' is not a specific product, but is the average price across all private label or store brand FCOJ products sold within a specific GMA. For the refrigerated segment, one brand is a specific refrigerated product from concentrate, the other is a specific not-from-concentrate product, and 'private label' is again an average of prices, but this time for all private label refrigerated from concentrate products within a specific GMA.

In order that one might compare relative prices between groups of markets, for example 'low' verses 'high', figure B-1 and subsequent figures show prices in all quarters for both the low and high groupings after they are divided by the first quarter price of the commodity in the low grouping of markets. For each of the six commodities, we denote the Q1 price of the low grouping as the 'base price,' so that the first of eight price bars presented for each commodity (prices in four quarters for two market groupings) always has a value of 1, since the first quarter low market price is divided by itself. All other price bars in each group of eight reflects the price in a particular quarter (Q1 to Q4) for a particular market group (low or high) relative to the base price.

For example, in figure B-1, the Q1 price of Brand 1 in the high group (depicted by the dark shaded bar) has a value of 0.95, while the Q3 price in the low group has a value of about 1.2. These indicate that the Q1 price in the high group for Brand 1 is 5-percent lower than the base price, and that the Q3 price in the low group is about 20-percent higher than the base price. In some instances in this section, it may be noted that the largest percentage increases from a Q1 price were observed in the high market groupings, but the figure this statement pertains to shows the highest bar is for a price in the low grouping. This is best explained by an example. If a low group price in Q3 is 10-percent higher than the low group price in Q1, a bar in the figure would rise to 1.1, since Q1 low is the base price. For this same product in the high group, suppose that the third-quarter price is 10.5 percent higher than its Q1 price in this high group, but that the Q1 price in the high group is 5-percent lower than the base price. In this case, the bar in the figure depicting the Q3 price in the high group would rise to 1.05 since 1.05 divided by 0.95 (the Q1 price in the high group relative to the base price) equals (approximately) 1.105.

The first graph in figure B-1 depicts the four quarterly average prices in the frozen segment. This graph tells us that for all three products, average first-quarter prices are lower (by as much as 10 percent for private label products) in the group of markets with a high degree of retail chain concentration. While prices in the subsequent three quarters generally go up and then down (reflecting the effects of the December 1989 freeze), those markets with 'low' retail concentration maintain a higher price for each of the three commodities.

The other graph in figure B-1 depicts the same information for the three commodities in the refrigerated segment. The story is very much the same, with the one exception being the first-quarter price of 'Brand 1', which is about the same in both the 'low' and 'high' market groupings. Otherwise, the pattern is strongly skewed to a result that indicates each of the six orange juice products were consistently lower priced in markets at advanced stages of retail market concentration. Each of these results are consistent with an interpretation that retail concentration produces cost savings for the retail orange juice markets that can be passed on to consumers in these markets.

Wholesalers. Grocery wholesalers purchase orange juice from marketing processors and other packagers, and distribute this juice to multiple retailer outlets (see box). In the

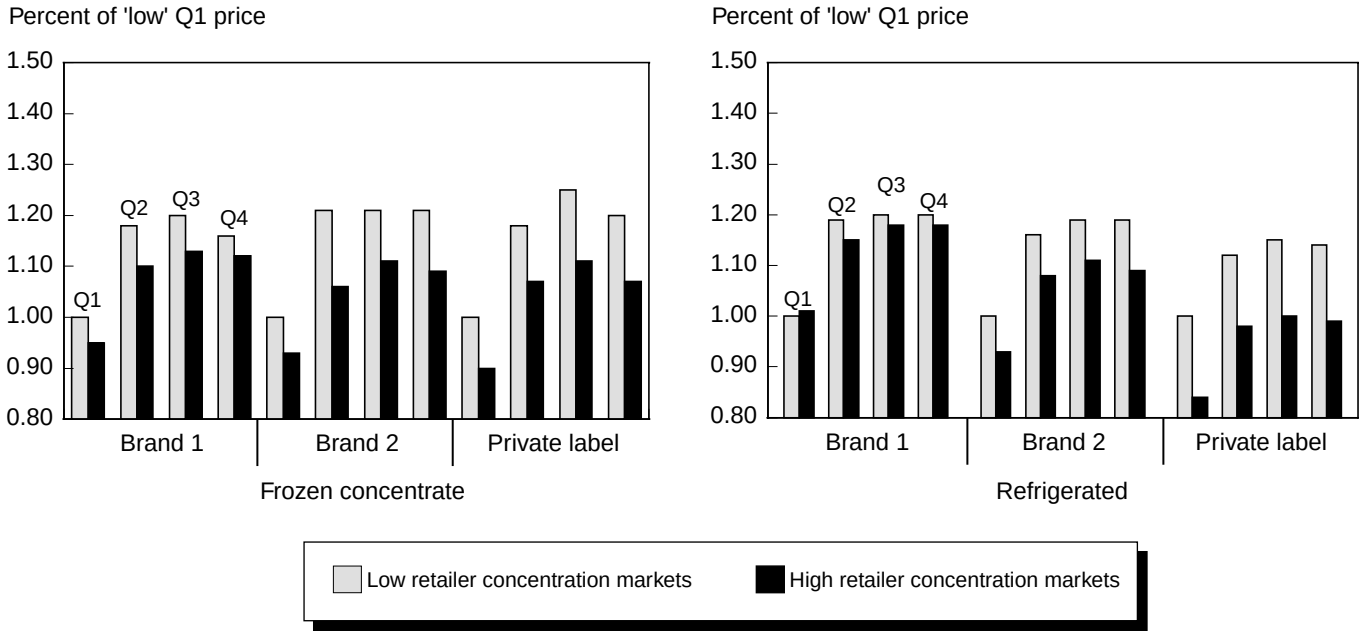
[4]The four largest chains within a grocery marketing area are generally a different group of four in each of the 54 market areas.

[5]Quarters' Q1 to Q3 represent 12-week intervals beginning Nov. 4, 1989, while Q4 is a 16-week interval ending Nov. 2, 1990.

Figure B-1

Quarterly market prices of orange juice for period ending November 2, 1990

Grouped by retailer four-firm concentration ratios



case of integrated wholesalers that are chained owned and operated, these outlets are the chain-owned stores. In the SAMI data, all of the products sold by retailers within a grocery marketing area were distributed to these retailers by wholesalers, or from warehouses of integrated retailers, with operations inside the grocery marketing area, as this is largely how these marketing areas were defined (Connor). On average in 1990, 69 pecent of the grocery wholesale business within a grocery marketing area was served by the four largest grocery wholesalers operating in that area. In some regions, the four largest grocery wholesalers serving that region supplied over 95 percent of the grocery market in their area, while other marketing areas saw as little as 42 percent of their grocery products passing through the four largest wholesalers servicing their marketing area.

For the same reasons as were discussed concerning retailer concentration, it is useful to observe orange juice market prices in areas of 'high' and 'low' wholesaler concentration ratios. Figure B-2 presents this information, using the same approach as was presented in figure B-1. The only difference being that the 10 marketing areas comprising the 'low' group reflect the 10 grocery marketing areas with the lowest concentration of wholesalers servicing these markets, and similarly, the 'high' grouping reflects the 10 highest such markets. Focusing first on the three commodities within the frozen segment, the findings nearly replicate those for the frozen segment in figure B-1. This indicates that orange juice markets where wholesale concentration is far advanced have very similar frozen concentrate orange juice pricing behavior as markets where retail concentration is far advanced.

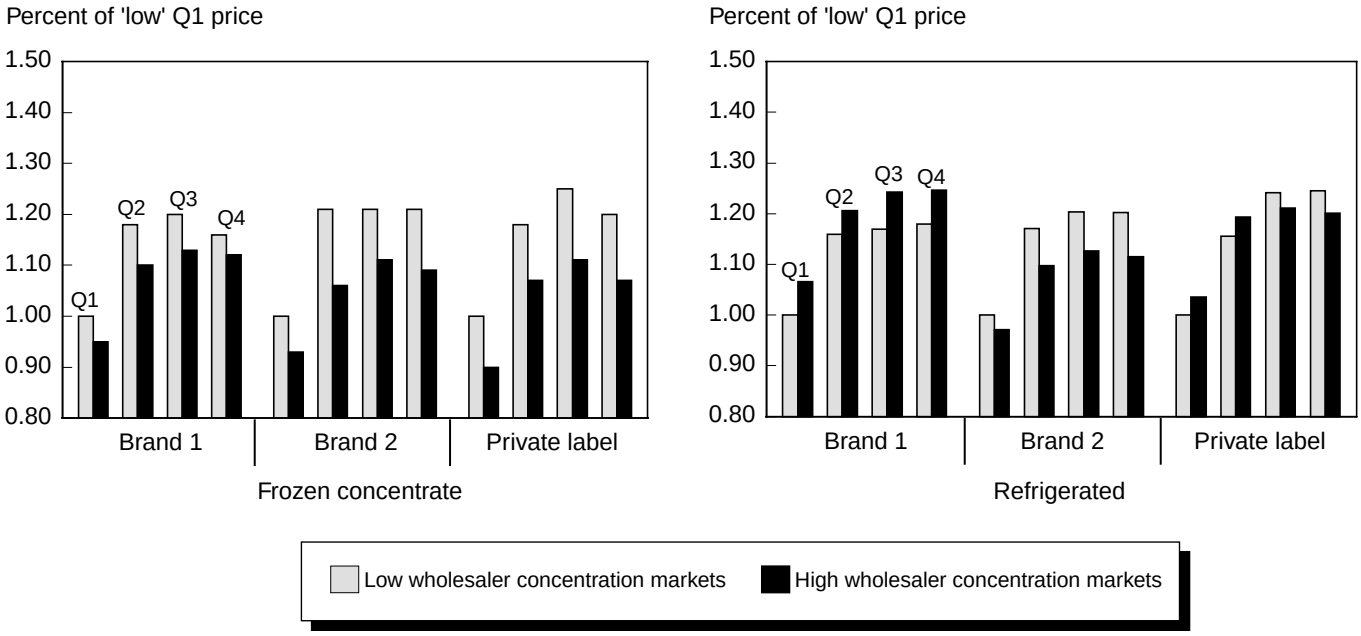
This is not the case for the refrigerated segment, where it appears equally as likely that orange juice prices are higher in either the 'high' or 'low' market groupings. For example, 'Brand 1' is priced higher in all four quarters in the 'high' market group, while 'Brand 2' shows the opposite result. For 'private label' brands, the price is higher in the 'high' markets in the first two quarters, and lower in the last two quarters. A closer look at the price data for the refrigerated segment shows that for all three brands, the highest percentage price increases occurred in the 'low' market groups. Taken collectively, the results in figure B-2 suggest, but not as strongly as for retailing, that markets with more advanced concentration of the grocery wholesaling functions tend to have lower market prices than do markets where such concentration is less advanced. There was a considerable shift in consumer preferences towards the consumption of refrigerated juices (particularly NFC) taking place in this period (Brown, et. al.), so it is not surprising that price behaviors are hard to discern in this segment.

Brands. Within the Florida market, there were 27 citrus processors operating in the 1989-90 growing season. For the retail market, what was not produced by or sold to the national brand marketers was packaged and sold under numerous regional brand names and private labels. While private label orange juice brands are not nationally marketed under a single brand name, one or several private label brands are available in every GMA. For example, a single bulk processor may produce an orange juice product that is marketed by several grocery chains under different brand logos. Another way a processor's product is marketed is

Figure B-2

Quarterly market prices of orange juice for period ending November 2, 1990

Grouped by wholesaler four-firm concentration ratios



under a regional brand logo. These products have a limited distribution area, possibly spanning several adjacent GMA's. Of the three types of marketing outlets, only the leading national brands engage in extensive national promotional activities, which can involve tens of millions of dollars for a single advertising campaign (Hardy). In 1990, the highest market share for a leading national brand in a single GMA was 38 percent (based on warehouse shipments to supermarkets within each GMA), while the highest combined market share for private labels was 47 percent.[6] Variations on these shares were large across the different markets.

Among the most notable trends related to brand competition over the 1990s has been the continued growth in market share of private label orange juice brands. For example, in the frozen juice category for the 52-week period ending January 2000, 32 percent of sales in supermarkets were for private label brands, and this share is up from 30 percent in the previous year (PLMA's 2000 Private Label Yearbook). Also, specific private label brands from the largest grocery retailers are likely to be taking market shares away from other private label brands. In the GMA's covered in this study for 1990, private label market shares were as high as 32 percent in the refrigerated segment and 47 percent for FCOJ. Averages were much lower—20 percent in the frozen segment and 11 percent in the refrigerated segment. This variation affords the opportunity to compare orange juice prices in high and low private label market share GMAs.

Figure B-3 depicts the markets with the 10 highest private label market shares and the markets with the 10 lowest shares. In both the frozen and refrigerated segments, the first quarter price is always lower in markets with high private label market shares, particularly in the refrigerated section. But after the effects of the negative orange supply shock drives prices of orange juice up, the price of most commodities goes up faster in those markets where private label shares are high. While this may suggest a mixed result, it is consistent with a scenario whereby the existence of a large private label market share brings the price of the leading national brands down. When the negative orange supply shock hits, processors must pass the full cost on to their customers in the markets with high private label shares since their price/cost margins in these markets are already low. Another result that stands out in the figure for the refrigerated segment is the large gap between markets with high and low private label shares for average first-quarter prices of both national brands. In subsequent quarters, the price of refrigerated orange juice does not change much in markets with low private label market shares, while the price increases noticeably in the markets with high private label shares. These findings are compelling evidence that national brand orange juice processors are very responsive to private label competition in regional markets.

[6] By way of an example, the 'Brand 1' refrigerated market share reflects the gallons of all variants of this brand of refrigerated orange juice shipped to a GMA, divided by total gallons of all orange juice shipped to this GMA, including FCOJ shipments. FCOJ shipments are converted to their fresh equivalent volume.

Orange Juice Industry Overview

Florida typically accounts for more than 90 percent of orange juice production (USDA, 2000a). However, in the 1989/90 freeze year, Florida produced only 85 percent of the domestic orange juice supply, with Arizona, Texas, and California providing the balance. In addition to domestic production, imports are also an important source of supply. Brazil and Mexico are the major exporters to the United States (USDA, 2000b). In the years from 1989-91, Brazil accounted for approximately 85 percent of U.S. frozen imports, (which are either sold domestically as frozen or reconstituted and sold as chilled), while Mexico was the source of nearly all premium chilled orange juice. Frozen concentrate accounts for approximately 98 percent of total orange juice imports with not-from-concentrate making up the remaining 2 percent.

Processing and Packaging. In Florida, around 95 percent of orange production is purchased by orange processors (USDA, 2000b). The juice is either pasteurized immediately in the case of NFC or is processed into FCOJ. There are two types of orange processors – bulk processors and marketing processors. Bulk processors produce the majority of orange juice in the world. Marketing processors sell packaged juice under their own brand name and they often also purchase additional juice from bulk processors.

Juice packers purchase bulk product and package it and in most cases, distribute the packaged product. Some juice packers pack and market their own brands, while most pack for private labels. Another participant that may handle orange juice are blending houses, which are typically located in port cities. Blending houses blend concentrates from different sources and with different quality attributes in order to match customer specifications. In this case the buyer pays a higher price for a product that consistently meets its standards.

Most orange juice is transported in the form of bulk FCOJ to packing plants throughout the United States, since shipping volumes are 5-6 times smaller with concentrate than with reconstituted juice. Before packaging in the familiar round package, filtered water is added to the concentrate to bring the brix, a measure of concentration of solids, down to three times the concentration level of fresh juices. In order to bring the FCOJ to the concentration level of fresh orange juice, three parts water must be added by the consumer. For reconstituted juices, filtered water is added to return the brix to the average of fresh squeezed juice. It is then packaged in cardboard cartons, glass, or plastic jugs and sold at retail stores.

While only a small portion of concentrate is reconstituted and packaged at the processor, the majority of NFC is packaged at fruit processing sites and transported in final form. Limited amounts of bulk not-from-concentrate is also transported by road and rail tanker to other parts of the country for packaging.

Storage. Bulk frozen concentrate can be stored for several years provided the temperature is kept at acceptable levels. NFC can be stored two ways, frozen or chilled. Each of these storage methods allows NFC to be stored for at least a year, a necessity as juice harvested from different times of the season are blended to obtain consistent quality the whole year through. NFC in retail packaging has a shelf life of approximately 63 days.

Nearly all storage is in the South Atlantic region and is distributed throughout the country to meet demand. FCOJ stocks are highly seasonal as stocks are at their lowest in November, at which time production begins anew, and peaks in May, when the last of the Valencia crop has been harvested.

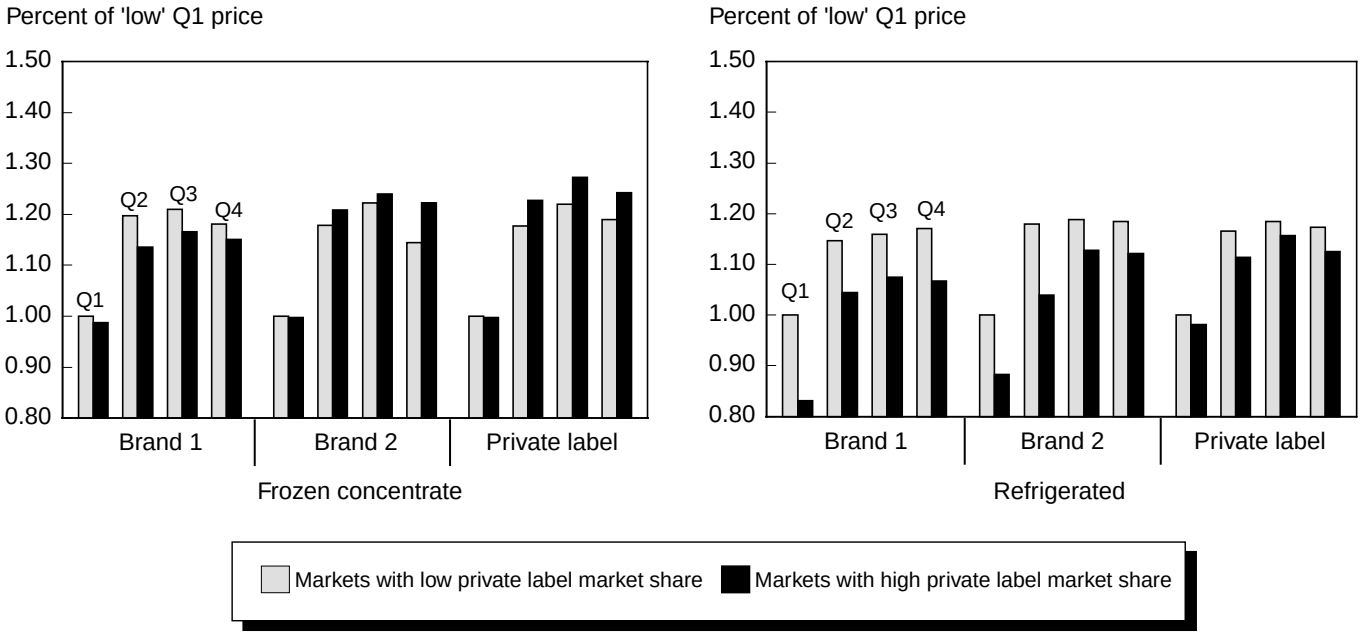
Distribution. Nearly all orange juice distribution for retail sales follows one of three paths: 1) delivery through wholesalers, 2) delivery through retailers, and 3) delivery directly to the retail store. In the case of delivery through wholesalers, the advantage for the packer is the fact that they make only one transaction, as opposed to dealing with a number of individual stores. Also, the producer is more likely to gain wider distribution of their product. Retailers have also taken over the wholesale function. In this situation, producers reduce transactions, yet distribution across various retailers may require processors to work with a larger number of wholesale distributors. These first two paths are common for frozen, while the third, direct shipment to the retailer, is more common with chilled products.

Consumer Preferences. The last decade has seen a large swing in consumer demand from frozen orange juice toward refrigerated, and especially not-from-concentrate juices. The 1990 season is the first year in which chilled orange juice outsold frozen concentrate, and the gap has consistently widened since that time. Refrigerated orange juice is made from concentrate, except for those designated “premium” which are made from fresh oranges and never concentrated. The refrigerated type is more important in terms of sales than are frozen and shelf stable.

Figure B-3

Quarterly market prices of orange juice for period ending November 2, 1990

Grouped by private label market share



Consumer demographics. Another way companies exercise market power is through segmentation of the consumer market, by charging different prices to different segments of consumers. With the data used here, it is not easy to discern at which level of the supply chain this pricing behavior originates, but prices are available in markets that have clearly distinguishable consumer characteristics. One approach is to determine if average household income within a specific market affects the market price of orange juice.

In the frozen segment, prices start higher and remain so throughout the year in markets where household incomes are high (fig. B-4). In the refrigerated segment a distinct pattern does not appear to show up. A closer look at the data reveals that for five out of the six commodities, the highest percentage increases in price occurred in markets with high household incomes. While a number of possible explanations can be offered, it will simply be noted here that the results from this experiment suggest there may be some tendency towards higher consumer orange juice prices in areas with high household incomes.

Summary

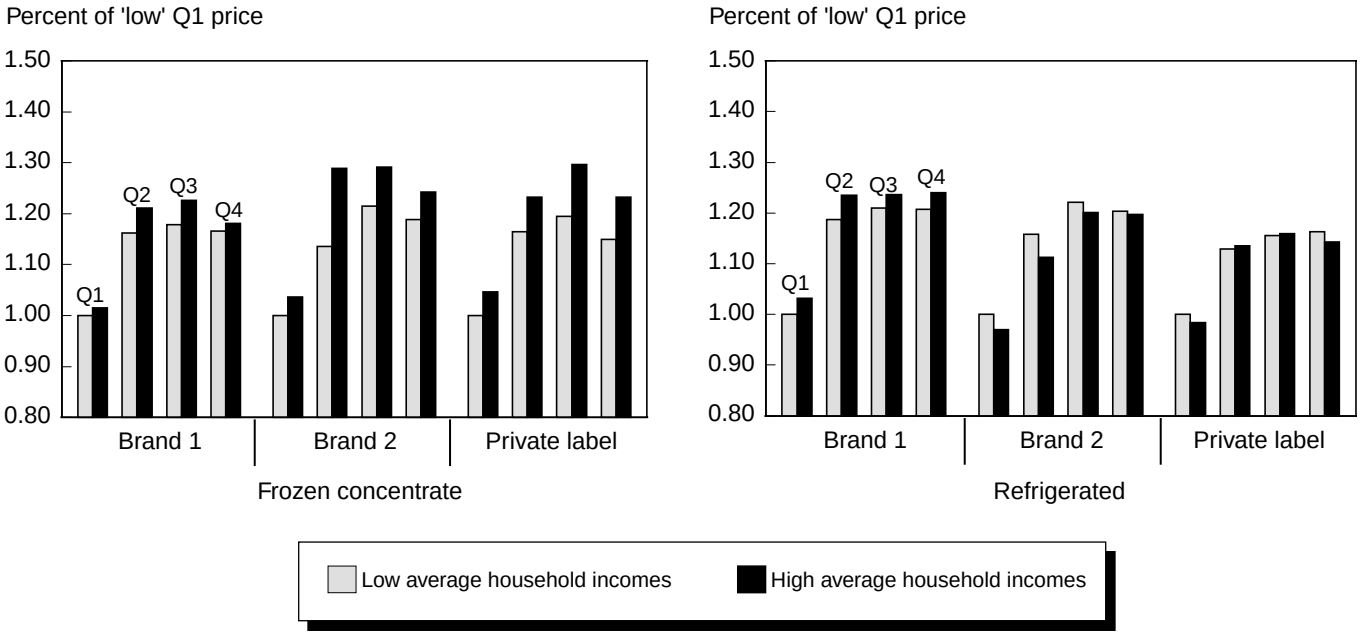
There are far fewer sellers and buyers along the orange juice supply chain today than there were only 10 years ago. This article presented comparisons of pricing behavior at the beginning of this timeframe (1990) between markets more advanced in the marketing consolidation process and markets far less so. Findings indicate that retail orange juice prices were generally lower in markets where a few grocery chains controlled large shares of the area grocery market. Lower prices were also found in markets where large grocery wholesalers and/or integrated retailers dominate market sales. Also observed from this data was an apparent relationship between private label presence in a market and lower prices for leading national orange juice brands. Related to this, it was found that price increases were more pronounced in areas with strong private label competition, and this appeared to reflect smaller cost-to-price margins in these markets. These smaller margins mean there is less of a buffer for retailers or brand producers to hold prices steady when grower prices increased with the freeze-induced commodity shortage. While prices appeared to be higher in markets where average household incomes were high, these findings were not as pronounced. Taken together, the data shows how consolidation along the orange juice supply chain, such as has occurred over much of the past decade, could have contributed to lower market prices. Also apparent in this data are some indication that diminished competition, particularly diminished private label competition, leads to higher market prices.

The findings presented here are largely anecdotal evidence of market pricing behavior. For example, it is very likely that markets with a high concentration of large grocery chains also have similar concentrations of wholesalers and a strong private label presence. Another possibility is that GMAs where wholesale or retail concentration is less advanced may happen to be primarily in areas that are a long shipping distance away from the Florida market. In similar analysis to that presented here (omitted from this

Figure B-4

Quarterly market prices of orange juice for period ending November 2, 1990

Grouped by average household income within market area



report), it was found that retail prices, particularly in the refrigerated segment, were substantially higher in markets further away from the Florida market. This is most likely explained by transportation costs and this could be what is showing up in the market groupings for low retail, wholesale, or private label concentration, in which case those findings may be misleading. Similar concerns can be raised about our analysis of household incomes.

To overcome this uncertainty, the evidence of market pricing behavior discussed in this report was examined by use of regression analysis. Although the details of this analysis are not presented, the results did indicate that many significant statistical relationships of the type suggested here were found to exist. These findings show, for example, that after controlling for the other factors discussed in this paper (and others not discussed), there is still a strong statistical probability that high private label market shares in the refrigerated orange juice segment make it likely that national brand refrigerated orange juice prices were lower in these areas than elsewhere. Retail concentration was found to have the same effect, although not quite to the same extent as was the private label effect. A less compelling result for the effects of household income on market prices was found using regression analysis. While higher market area household incomes appeared to lead to higher retail orange juice prices, the statistical probability that income and prices are related in this way was found to be rather low.

Since the period of this analysis, there has been more widespread consolidation of grocery retail and wholesale operations, and the private label/store-brand products have also flourished. Consumer preferences have substantially shifted from frozen to refrigerated juice varieties, and with this shift, brand market shares have also changed. So, while it appears that the cost-reducing forces have outweighed the anti-competitive forces as consolidation has advanced in the orange juice supply chain, continuing consolidation in the orange juice marketing system has not diminished the potential that anti-competitive forces may push up retail orange juice prices in the future.

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